Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Pages	Mark
3	
4 – 5	
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20 – 21	
22 – 23	
TOTAL	

General Certificate of Secondary Education
Higher Tier
November 2014

Mathematics (Linear) 4365/1H

Paper 1

H

Wednesday 5 November 2014 9.00 am to 10.30 am

For this paper you must have:
- mathematical instruments.

You must **not** use a calculator

Time allowed
- 1 hour 30 minutes

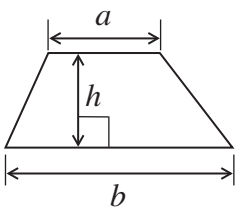
Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 70.
- The quality of your written communication is specifically assessed in Questions 3, 9, 12 and 14. These questions are indicated with an asterisk (*).
- You may ask for more answer paper, tracing paper and graph paper. These must be tagged securely to this answer book.

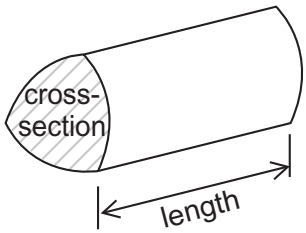
Advice
- In all calculations, show clearly how you work out your answer.

Formulae Sheet: Higher Tier

Area of trapezium = $\frac{1}{2}(a+b)h$

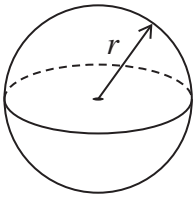


Volume of prism = area of cross section × length



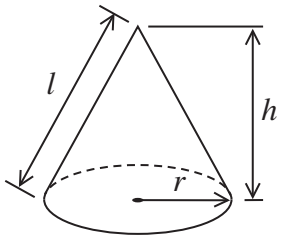
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3}\pi r^2 h$

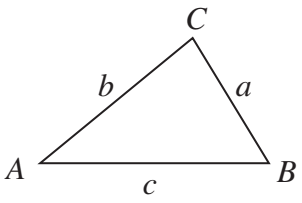
Curved surface area of cone = $\pi r l$



In any triangle ABC

Area of triangle = $\frac{1}{2}ab\sin C$

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$



Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

Answer **all** questions in the spaces provided.

1 Anna wants to know the colours of cars in the school car park.
Brian wants to find out what students think about school dinners.
Carl wants to test people's reaction time.

Here are four data collection methods.

1 Questionnaire

2 Controlled experiment

3 Observation

4 Data logging

Choose the method each person should use.

[2 marks]

Anna .....

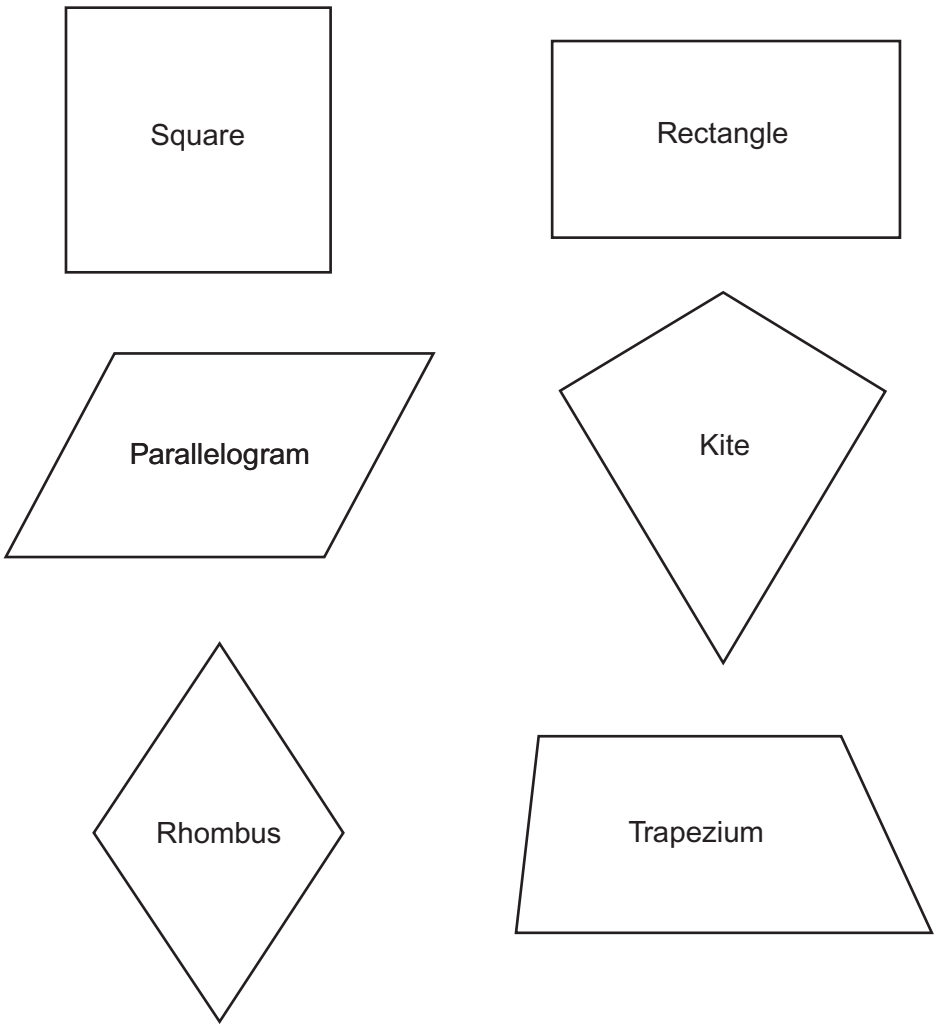
Brian .....

Carl .....

Turn over for the next question

2

2 Here are six quadrilaterals.



2 (a) Write down the names of the **three** quadrilaterals that have diagonals crossing at right-angles.

[2 marks]

Answer .....

and .....

and .....

2 (b) Three quadrilaterals are

Square Rectangle Parallelogram

The parallelogram could be the odd one out.
Give a reason why.

[1 mark]

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2 (c) Three quadrilaterals are

Rectangle Parallelogram Rhombus

Tick the **one** property that these three quadrilaterals have in common.

[1 mark]

All four sides the same length ☐

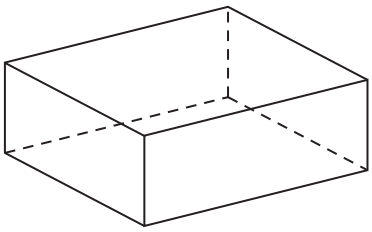
All four angles equal ☐

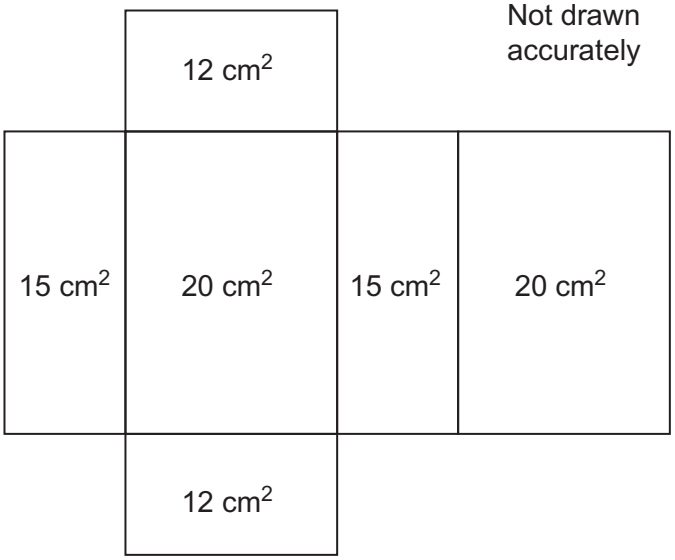
Diagonals bisect each other ☐

Two lines of symmetry ☐

4

***3** Here is the net of a cuboid.
The net shows the area of each face.





Work out the **volume** of the cuboid.

[4 marks]

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Answer ..... cm^3

4 (a) The manager of a leisure centre uses this question in a survey.

How much time do you spend taking exercise?

Never ☐ 0 – 1 hours ☐ 1 – 2 hours ☐ 3 – 4 hours ☐

Write down **two** things that are wrong with this question.

[2 marks]

1 .....

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2 .....

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4 (b) Complete the response section for this question.

[1 mark]

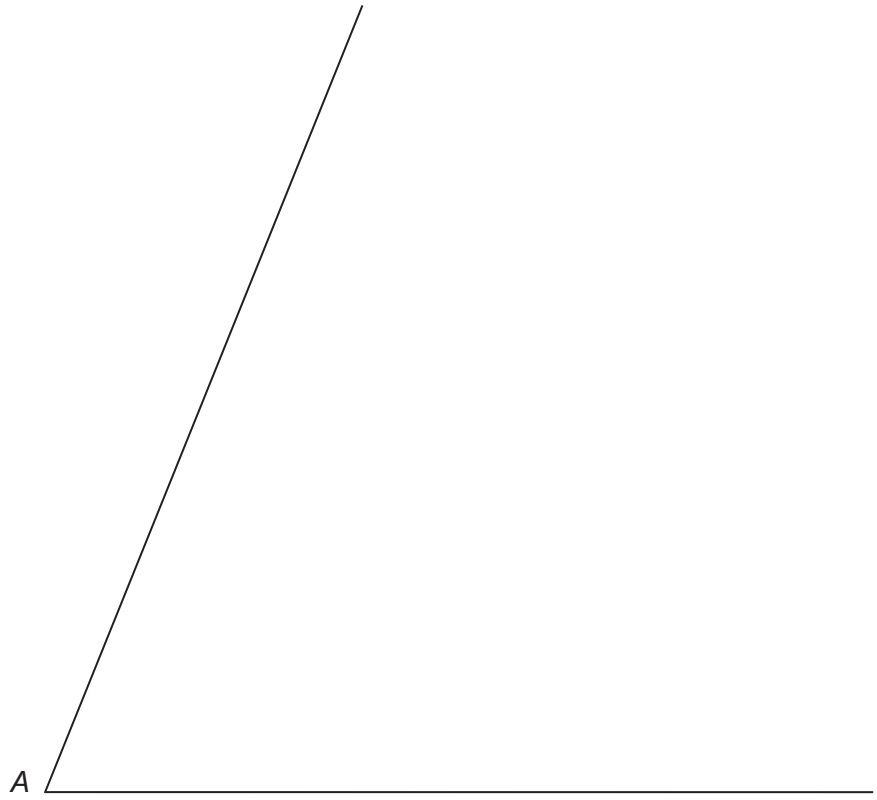
How many days in a week would you use the leisure centre?

7

5 You will need a ruler and compasses to answer this question.

Construct the angle bisector of angle *A*.

[2 marks]



6 Expand and simplify $3(x + 2) + 2(x - 1)$

[2 marks]

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Answer .....

7 (a) Three electric cars are tested by driving them around a track until the battery runs out. The table shows some information about their performance.

Car	Total time travelled (hours)	Average speed (km/h)	Total distance travelled (km)
A	4	35	
B		40	180
C	3		150

Complete the table.

[3 marks]

7 (b) Two cars are driven around a 10 kilometre track.
Both cars leave from the start line at the same time.

Car X travels at exactly 40 km/h
Car Y travels at exactly 30 km/h

How many minutes will it be before they pass the start line together again?

[2 marks]

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Answer ..... minutes

9

8 The table shows the length of the forearm, f, measured in cm, and the height, h, measured in cm, for 10 people.

Person	Length of forearm, f (cm)	Height, h (cm)
A	11	108
B	25	160
C	18	140
D	28	180
E	15	120
F	21	140
G	17	118
H	26	164
I	13	100
J	24	150

A scatter diagram of the data is shown opposite.

8 (a) Another person has a height of 145 cm

Use the scatter diagram to estimate the length of their forearm.
Show clearly how you found your estimate.

[2 marks]

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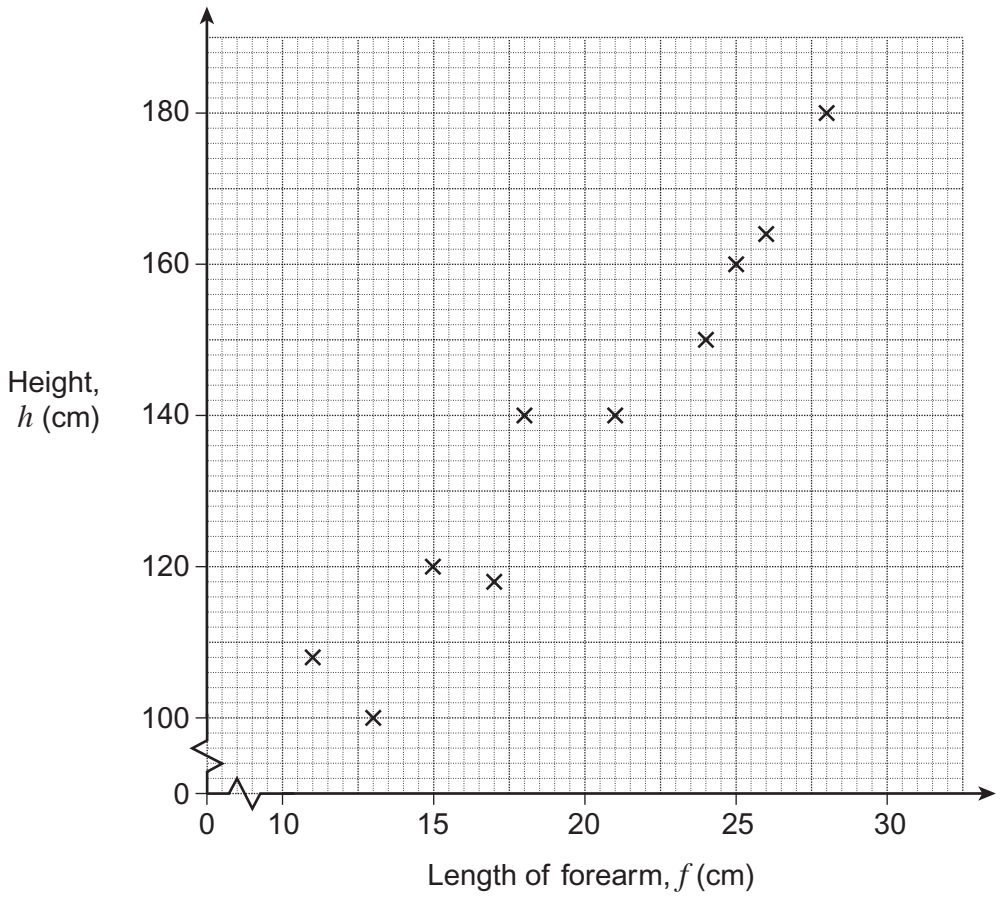
Answer ..... cm



8 (b) An approximate formula connecting h and f is $h = 4 \times f + 60$

Choose a person from the table and test the formula.

[2 marks]

Person chosen .....

Does the formula work **exactly**?
Tick a box.

☐ Yes ☐ No

Show how you worked out your answer.

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4

9 A small building company has 10 employees.
The table shows their monthly salaries.

Job	Number of employees	Monthly salary
Labourer	5	£1200
Driver	3	£1400
Supervisor	1	£2500
Manager	1	£13 500

9 (a) What is the modal monthly salary?

[1 mark]

Answer £ .....

***9 (b)** The median monthly salary is £1300
Explain why.

[1 mark]

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9 (c) The mean monthly salary is £2620

Give a reason why the mean is **not** the best average to use for the 10 employees.

[1 mark]

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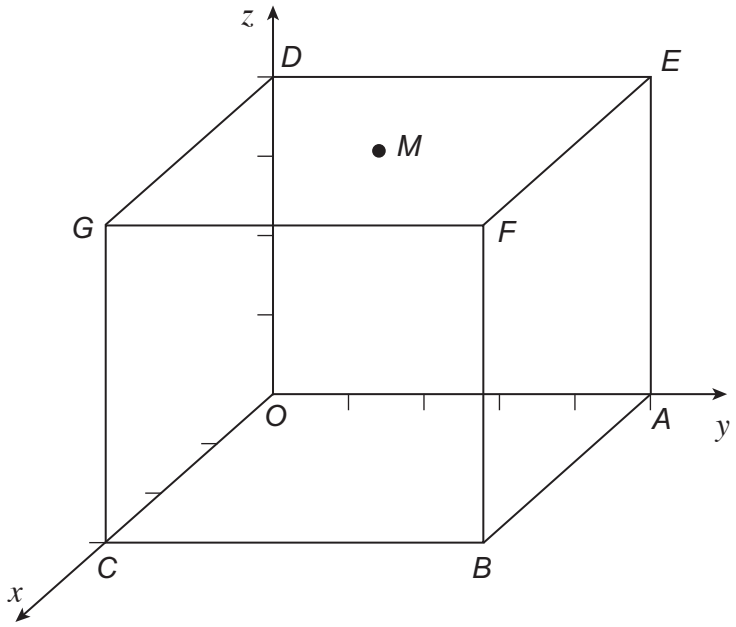
10 A cuboid is drawn on a 3D coordinate grid, as shown.
OC = 3 units, *OA* = 5 units, *OD* = 4 units
M is the centre of the face *DEFG*.



10 (a) Which point has coordinates (3, 5, 0)?
Circle the correct letter.

[1 mark]

A *B* *C* *D* *E* *F* *G*

10 (b) The numbers 3, 4 and 5 form a Pythagorean triple because $3^2 + 4^2 = 5^2$

Which **other** point, apart from *A*, is 5 units from *O*?
Circle the correct letter.

[1 mark]

B *C* *D* *E* *F* *G*

10 (c) Work out the coordinates of the centre, *M*, of the face *DEFG*.

[2 marks]

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Answer (..... , ... , ...)

7

11 Loren puts £600 in a bank account.
The account pays 3% compound interest each year.
After **one** year she withdraws £200

How much will she have in the account after **two** years?

[3 marks]

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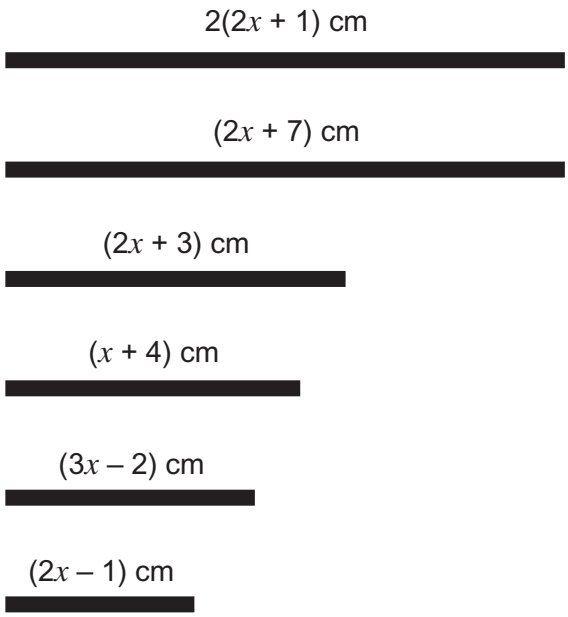
Answer £ .....

***12** Here are six rods.
The two longest rods are the same length.



Not drawn accurately

The six rods can be fitted together to make a quadrilateral with equal sides.

Use **algebra** to show clearly how this can be done.

[5 marks]

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8

Turn over ▶

13 (a) Write the number 0.000 000 7 in standard form.

[1 mark]

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Answer .....

13 (b) Write 3×10^5 as an ordinary number.

[1 mark]

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Answer .....

13 (c) Work out $4 \times 10^3 \times 8 \times 10^5$

Give your answer in standard form.

[2 marks]

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Answer .....

***14** 6 cups of tea and 4 cakes cost £13.20
5 cups of tea and 4 cakes cost £12.00

Is £10 enough to buy 3 cups of tea and 4 cakes?

[4 marks]

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Turn over for the next question

8

15 Rearrange the formula $y = \frac{3x - 2}{x + 1}$ to make x the subject.

[4 marks]

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Answer .....

16 The table and histogram show some information about the cholesterol level in the blood of 100 hospital patients.

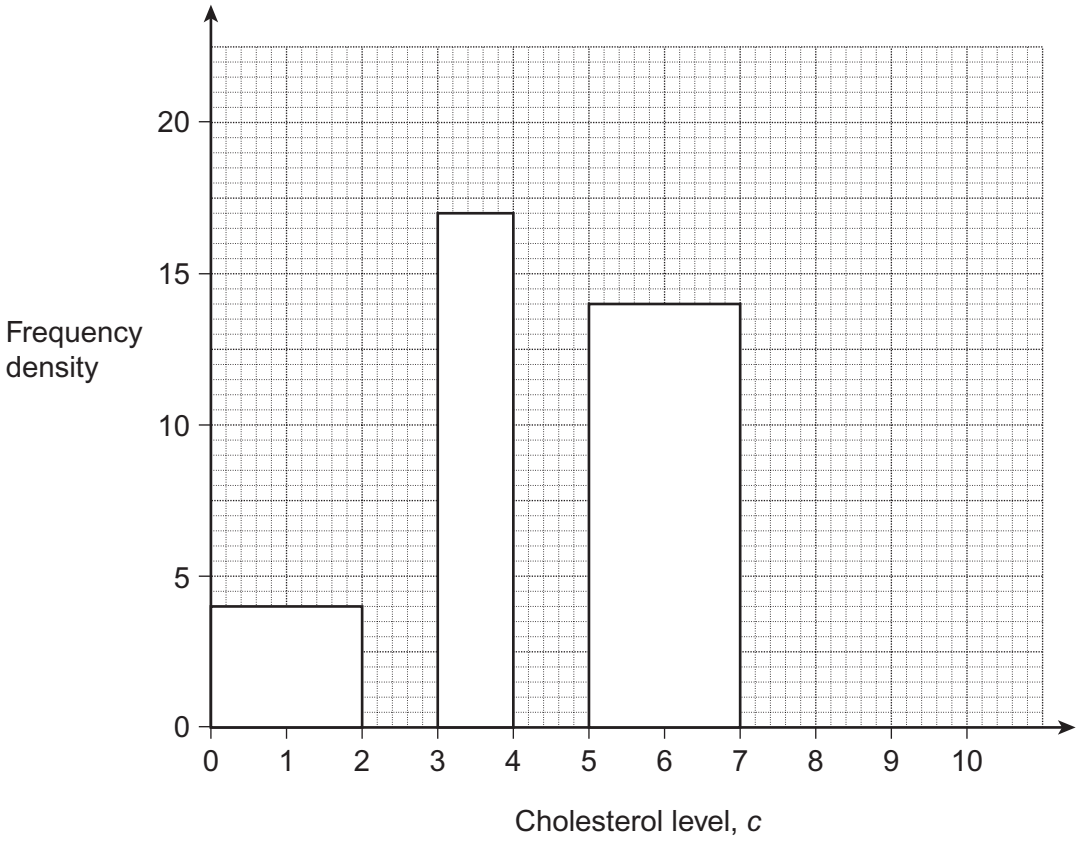
Cholesterol level, c	Frequency
$0 < c \leqslant 2$	8
$2 < c \leqslant 3$	13
$3 < c \leqslant 4$	
$4 < c \leqslant 5$	19
$5 < c \leqslant 7$	
$7 < c \leqslant 10$	15

16 (a) Use the table to complete the histogram.

[2 marks]

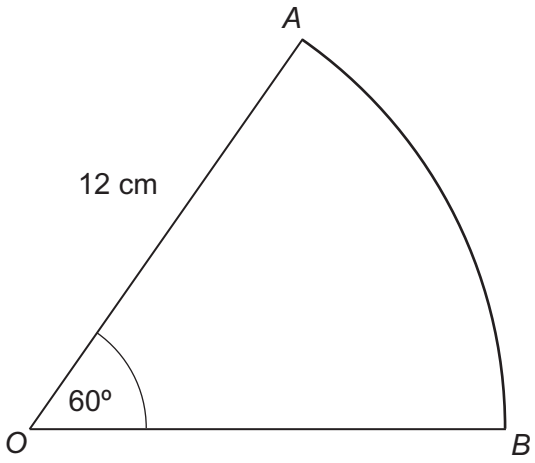
16 (b) Use the histogram to complete the table.

[2 marks]



8

17 *OAB* is a sector of a circle of radius 12 cm
Angle *AOB* = 60º



Not drawn accurately

Work out the length of the arc *AB*.
Give your answer in terms of π.

[2 marks]

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Answer ..... cm

18 Solve $x^2 + 6x + 2 = 0$

Give your answer in the form $a \pm \sqrt{b}$ where a and b are integers.

[4 marks]

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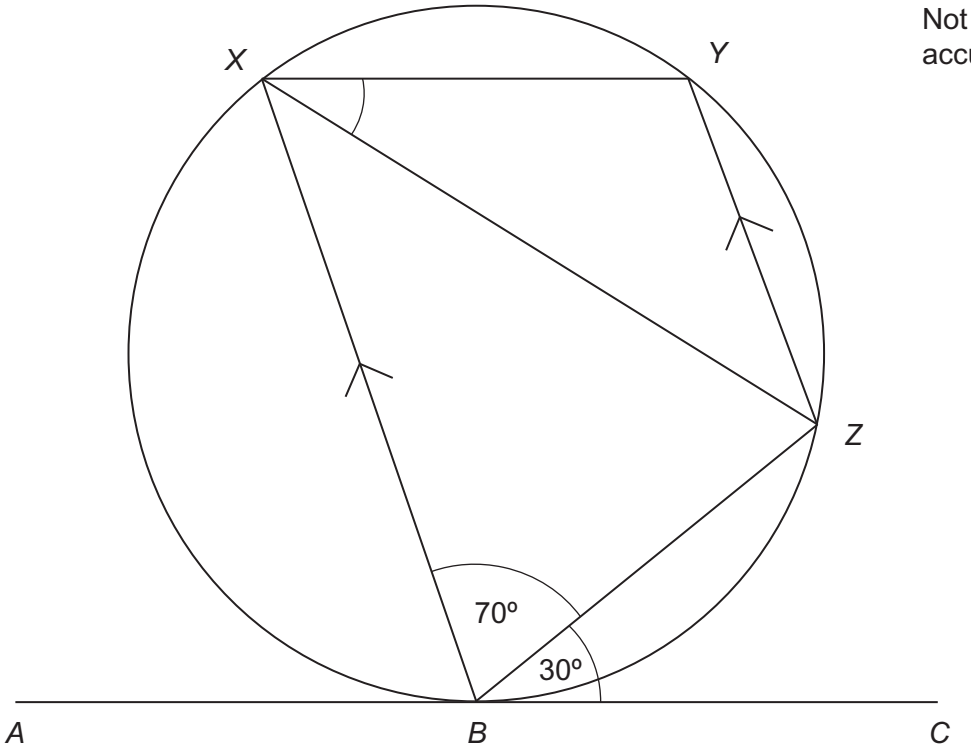
Answer .....

Turn over for the next question

6

19 *B*, *X*, *Y* and *Z* are points on the circumference of a circle.
ABC is a tangent to the circle.
BX is parallel to *ZY*.



Not drawn accurately

Work out the size of angle *ZXY*.

You **must** show your working, which may be on the diagram.

[3 marks]

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Answer ..... degrees

20 (a) Circle the value that is equivalent to $\sqrt{50} + \sqrt{32}$

[1 mark]

$9\sqrt{2}$ 41 $\sqrt{82}$ $2\sqrt{41}$

20 (b) Circle the value that is equivalent to $4\sqrt{75} \div 2\sqrt{3}$

[1 mark]

$2\sqrt{72}$ 10 $2\sqrt{15}$ 20

21 Given that $3^x = 9^{x+1}$ work out the value of x.

[2 marks]

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$x =$ .....

END OF QUESTIONS

7

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED